The Northwestern MILLER
MILLING PRODUCTION SECTION

Grinding With Controlled Roll Pressure

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(EDITOR'S NOTE: The following article is Contribution No. 200 from the Department of Milling Industry, Kansas Agricultural Experiment Station.)

THERE is a need for a more reliable and reproducible method for controlling the grinding process in flour manufacture. Determination of maximum grinding efficiency usually is accomplished by the break release test, which is an objective and reproducible method. Setting reduction rolls, however, generally is done on the basis of "feel" which the miller learns through experience. This method is subjective and, of course, the results obtained are subject to variability between millers.

To fill the need of an objective test or method for setting reduction rolls, an investigation was made of the utility of Statimeters for measuring roll pressures.

Statimeters As Pressure Gauges

To measure roll pressure it is necessary to mount pressure gauges on the tension rod of the roll stand. Forces other than the pressure on the rolls may affect the pressure registered on the gauges. For example, the belt pull on the style "A" roll drive is not always directly down on the tramming eccentric which is the pivot point for the swing arm. With other types of drives such as gears, there probably would be some effect on the tension rod pressure. Also, if the swing arm bends at the tramming eccentric due to the lock nut, this will also affect the tension on the spring tension rod.

For this investigation every effort was made to eliminate forces, other than roll pressure, which affect the tension rod. A drive was designed to operate the fast roll from directly above. To measure the tension rod pressure, Statimeters were used. This instrument consists of a flexible annular tube filled with a liquid mixture of glycerine and water which has been deaerated before being enclosed in a rigid casing. The casing is formed by two cup-shaped members, one telescoping within the other. Each member receives part of the flexible container. The liquid in the tube is piped by means of a capillary tube to a gauge of special construction, designed to withstand machine vibrations. Pressure applied to either end of the cup-shaped rigid casing is instantly transmitted to and indicated upon the gauge.

The ability of a confined and filled rubber tube (e.g., the thin-walled inner tube of an automobile tire) to support heavy loads and take punishment is well known, and the Statimeter makes use of this principle. Mounted on the tension rod of a roll stand, the Statimeter becomes an integral part of the machine. The Statimeter is shown in Figure 1 (a) and (b).

It is necessary to remove the spring tension rods from each end of the roll stand to mount the gauges. The rods must be cut at the point where the gauge will have suffi- (Continued on page 3a)

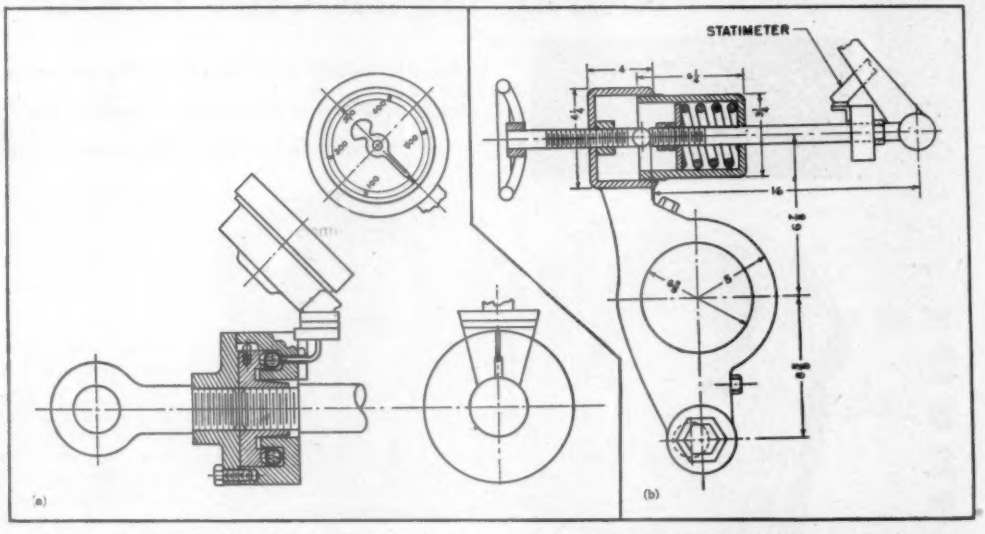

Fig. 1 (a) (b)—Cross-sectional diagram of Statimeter mounted on tension rod of 7-in. by 15-in. Wolf roll stand. (b) Diagrammatic sketch showing the roll adjustment on the Wolf roll stand with the Statimeter attached.

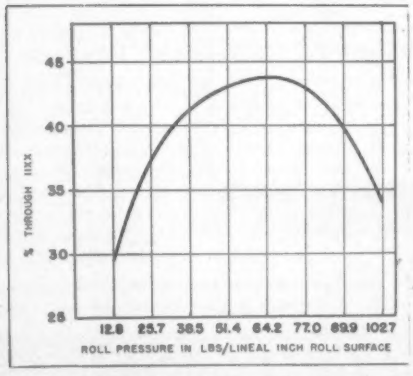

Fig. 2—Relationship between roll pressure and flour extraction

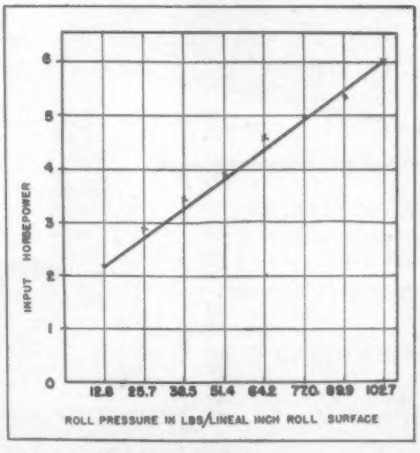

Fig. 3—Relationship between power consumption and roll pressure

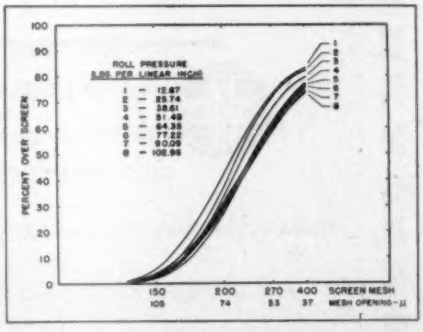

Fig. 4—The effect of roll pressure on flour particle size

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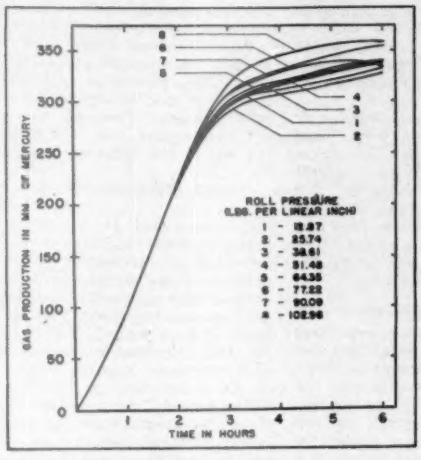

Fig. 5—Relationship of gassing power to roll pressure

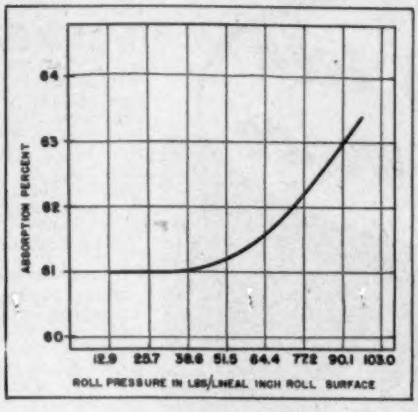

Fig. 6—Relationship of flour absorption to roll pressure

cient clearance when mounted on the roll stand. After cutting the rods they must be threaded at the cut ends, screwed into the Statimeter casings and locked in place. Care must be taken that the two ends do not touch inside the casings. The tension rod is then mounted on the roll stand in the normal way.

To set the springs with equal tension, it is necessary to place the rolls in tram and in the grinding position, touching each other. The spring tension housings are then adjusted against the springs, and set with equal pressures that are beyond the grinding pressure expected to be used. The adjustment handwheels are turned until the pressures read zero on both gauges. At this point the rolls are parallel.

Figure 1 (b) shows the position of the Statimeter on the Kansas State College Wolf 7-in. by 14-in. roller mill used for this investigation. The smooth rolls had a differential of 1½ to 1 and turned at the fast speed of 510 r.p.m. The principle of moments permitted the actual pressure on the rolls to be calculated. The Statimeter reads in pounds pressure, and the gauges used for this investigation were calibrated from zero to 500 lb. Statimeter pressures of 50, 100, 150, 200, 250, 300, 350 and 400 lb. were used to produce flour from hard red winter wheat third middlings stock.

Table 1.—Conversion of Statimeter readings to actual pressure in pounds per linear inch of roll surface.

Statimeter pressure reading on each end of the roll lb.	Actual pressure on each end of roll lb.	Actual roll pressure per linear in. of roll surface* lb.
50	90.1	12.87
100	180.2	25.74
150	270.3	38.61
200	360.4	51.48
250	450.5	64.35
300	540.6	77.22
350	630.7	90.09
400	720.8	102.96

*Calculated on basis of 14 in. of roll surface.

Table 1 shows the conversion from Statimeter readings to pounds pressure per linear inch of roll surface. This unit of pressure seemed most desirable since it could be standardized for further studies with different equipment. The rolls are 14 in. in length, but this length is not utilized fully because the roll saddles on each end take up some of the roll surface.

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A similar situation would prevail in most roller mill housings, and the amount of lost roll surface would be about the same. For this reason, the pressure was calculated on the full 14 in. of roll surface.

It was found that metal scrapers at high grinding pressures were more effective in keeping the rolls clean than were brushes, and also required less power. Modifications of the feeder roll and roll stand were required to obtain a uniform feed and to prevent the lock nuts on the tramming eccentric from restricting the movement of the swing arms.

Description of Flow

Third middlings stock was used throughout and the rate of flow was constant in all experiments at three pounds per minute. In each case the mill was operated with the regular roll suction and "warmed up" by grinding stock with the Statimeter pressure set at 200 lb. When uniform and favorable operating conditions were obtained the pressure set for 50 lb. and samples taken from under each end of roll. The extraction method was used to check the uniformity of the operation before and after taking samples.

Experimental Results

Using increment pressure changes of 50 lb., third middlings stock was ground and samples taken after 10 to 15 minutes of mill operation. Each series of tests was repeated several times. After each operation the amount of material passing through a number 11XX bolting cloth was determined by the use of an Allis-Chalmers experimental sifter. The relationship between roll pressure and percent extraction is shown in Table 2 and Figure 2. Extraction increased directly with roll pressure for a time but decreased after a certain critical pressure was reached.

Power measurements were made at each roll pressure as the samples were being ground. A portable test panel was used to obtain the wattmeter readings. The input horsepower requirements were calculated by the use of the following formula:

$$\text{Input horsepower} = \frac{\text{watts}}{746}$$

As illustrated in Figure 3, the horsepower required to drive the rolls increased proportionately with roll pressure. However, the maximum extraction was obtained at a roll pressure of approximately 64.5 lb. per linear inch of roll surface (see Fig. 2). This corresponds with a power requirement of slightly over 4 h.p. or about half-way in the scale of values reported for the entire experiment. The ground stock did not show visual signs of flaking until 90 lb. per linear inch of roll pressure was applied. Flaking was noticeable beyond this pressure.

Effect of Roll Pressure on Flour Properties

Flour granulation curves were made on the flours produced by the different roll pressures. The method used was that described by Wichser and Shellenberger (1948). Flour granulation curves are shown in Fig. 4. The results show definitely that flour granulation decreases as roll pressure increases.

An increase in roll pressure caused a slight decrease in the ash content of the flour produced from third middlings as shown in Table 3. An exgreater pressure tends to flatten whatever fibrous high ash material is present and thus it is sifted from the flour.

Similarly the protein content of the

Table 2—Relationship between roll pressure and percent extraction of flour sifted through 11XX silk flour cloth.*

Roll pressure in lb./linear inch roll surface	Flour through 11XX flour cloth — Five individual runs					Average
lb.	%	%	%	%	%	%
12.87	35.6	32.3	30.0	27.7	20.7	29.4
25.74	45.0	39.3	36.7	35.0	30.0	37.4
38.61	49.7	42.3	41.0	36.0	37.7	41.3
51.47	50.7	43.3	41.7	39.3	40.0	43.0
64.35	48.7	43.7	44.7	42.0	39.7	43.8
77.22	46.3	44.0	44.0	40.7	39.7	42.9
90.09	44.3	42.3	37.7	39.9	35.7	39.8
102.96	...	...	33.7	...	35.3	34.0

*Allis-Chalmers experimental sifter.

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Table 3—The relationship of ash and protein content to roll pressure using third middlings stock. Ash content .53%; protein content 10.65%.

Roll pressure in lb./linear inch roll surface	*Ash	Protein*
lb.	%	%
12.87	.43	10.5
25.74	.42	10.4
38.61	.40	10.4
51.48	.40	10.2
64.35	.38	10.3
77.22	.38	10.2
90.09	.37	10.1

*Results reported on 14% moisture basis.

planation for this could be that flours decreased with increased roll pressure as shown in Table 3, and it is believed that the explanation is the same as for the ash change.

Alsberg and Griffing (1925), Pulkki (1938) and others have reported the effect of fine grinding on flour properties and have reported that as the flour particles are reduced in size or mechanically damaged, both the diastatic activity and absorption increase. In the work reported here it was found as shown in Fig. 5 that the gassing power increased with increased roll pressure and absorption increased as measured by the Brabender Farinograph. The absorption curve is shown in Fig. 6.

There was no relationship between the valorimeter reading of the Farinograph curves and roll pressures used to produce the flours. Also there were no significant differences in the bread produced from the various flours.

Summary

Pressure gauges known as Statimeters were used successfully to control roll pressure during grinding. It was found that the power requirements increased directly with the pressure applied but flour extraction from third middlings stock increased up to a certain critical roll pressure and then decreased.

Increasing roll pressure did not affect the baking quality of the flours produced although it did increase absorption and gassing power, but lowered the ash and protein content slightly.

Flour particle size decreased slightly as roll pressure increased.

LITERATURE CITED

Alsberg, C. L., and Griffing, E. P.—Effect of fine grinding upon flour; Cereal Chem. 2:325-344, 1925.

American Association of Cereal Chemists—Cereal laboratory methods, 5th ed., Amer. Assoc. Cereal Chemists, St. Paul, Minn.; pp. 23, 24, 26, 101, 1947.

Pulkki, L. H.—Particle size in relation to flour characteristics and starch cells of wheat; Cereal Chem. 15:749-765, 1938.

Wichser, F. W., and Shellenberger, J. A.—Methods for determining flour particle size distribution; Cereal Chem. 25:155-167, 1948.

Acknowledgements

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—BREAD IS THE STAFF OF LIFE—

CHAIN DRIVES

On any chain drive, the minimum center distance between shafts must be greater than one half the sum of the diameters of the two sprockets. Center distances of 10 to 12 ft. can be used with finished steel roller chain without an idler to keep the chain from flopping. For distances greater than this, an idler should be used to prevent swaying or flopping.

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The chemical was discovered or developed by Prof. Karl Paul Link and his associates at the University of Wisconsin. The Wisconsin Alumni Research Foundation owns the patent to the chemical and that fact explains, in part, the commercial name of the substance. The initials of the foundation form the first syllable of the commercial name of the chemical.

The Wisconsin Alumni Research Foundation was organized in 1925 as a corporation, not for private profit, to administer patents developed at the university and to invest the major portion of the patent income in further research.

Warfarin is a single chemical: 3-(alpha-acetonylbenzyl)-4-hydroxycoumarin.

Warfarin and prepared baits containing warfarin are distributed by several botanical drug companies and pest control agencies.

S. B. Penick & Co. botanical drug house has recently published a booklet, "A Year's Experience with Dethmor," which contains facsimile reproductions of letters from users of its warfarinized bait, "Dethmor," which contains 0.5% warfarin and is extended with 19 parts corn meal to make a

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Following are some questions and answers about warfarin, prepared by Arthur Trowell, Inc., of Madison, Wis.:

Q. Do rats become shy and suspicious of warfarin bait?

A. No bait shyness develops when warfarin is used.

Q. Can warfarin products be purchased at feed stores, drug stores and other similar outlets?

A. They are generally available at all of these outlets under various trade names and with a notation on each label that the product contains warfarin.

Q. Can warfarin be used in cold weather?

A. Yes. Mixed in dry cereal-type baits, warfarin is as effective in cold as warm weather. Baits never freeze up.

Q. Will warfarin harm humans if contacted externally or taken internally?

A. Normally there is no harm in external contact, but care should be taken in handling it beecause of the remote possibility of allergic reactions. Sufficiently large concentrations taken internally over a relatively long period of time could cause ill effects, but there is little possibility that this will happen.

Q. What dosage is necessary to kill rats and mice?

A. The dosage varies. Properly mixed bait containing 0.025% warfarin should be made available until feeding stops. After that, a few permanent stations should be kept to control newcomers.

Q. If farm animals should eat dead rats killed by warfarin, how would it affect them?

A. The eating of several dead rats, whether poisoned by warfarin bait or killed in some other manner, may sicken or even kill a dog, cat or hog. Other animals are susceptible in varying degrees. For protection against possible harm, every effort should be made to prevent the eating of dead or dying rats.

Q. How does warfarin affect rats?

A. Warfarin reduces the normal clotting ability of the blood and causes the rodents to die of internal hemorrhage.

Q. Does it affect mice in the same manner?

A. Mice are similarly affected, but it may take a slightly longer baiting period to control them.

Q. Does warfarin kill rats and mice immediately?

A. No. Warfarin bait must be eaten over a period of days, usually 5 to 14.

Q. Will warfarin kill livestock and poultry?

Q. If humans consume warfarin, what should be done?

A. Instructions are on all labels of warfarinized poisons. First, call a doctor. Treatment of a patient in serious condition includes transfusions with whole blood and intravenous and oral administration of vitamin K preparations as in the case of hemorrhage caused by overdoses of Dicumarol (R).

Q. Has warfarin been used by any governmental agencies?

A. The U.S. Fish & Wildlife Service, the U.S. Public Health Service and the U.S. Department of Agriculture, which has registered warfarin and permitted its sale, have used warfarin. In addition, it has been used by many city and state health departments, county agents, pest control operators and others.

Q. Is it advisable to use warfarin mixed with any other rat and mouse killers?

A. No. This practice should not be followed because it destroys one of warfarin's great advantages — the complete lack of "bait shyness."

Q. Is there any special odor problem with rats and mice killed by warfarin?

A. In certain instances there may be a noticeable odor, since most of the rodents die where they live. The problem is of a very temporary nature, however. Odor from warfarin-killed rats has brought relatively few complaints.

Q. Where should the bait be placed?

A. In shallow containers along rat runways behind protecting boards or in specially constructed bait boxes.

Q. Does warfarin require pre-baiting?

A. No. Pre-baiting is not necessary. Warfarin baits are readily consumed and it has successfully controlled many infestations which defied control by other poisons because of "bait shyness."

Q. How is warfarin used in bait?

A. Warfarin concentrate, a dry powder, is usually mixed with cereal grain such as fresh ground yellow corn, household corn meal, rolled or ground oats. Ready-mixed warfarin baits are also available.

Q. How successful is warfarin bait in killing rats?

A. Warfarin bait has never failed to kill rats whenever it has been taken in sufficient quantity. It is important, therefore, that the bait mixture be highly acceptable to the rats.

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The Effect of Rains on Mature Wheat

EDITOR'S NOTE: The following article was first published in this journal as one in the "Chemistry for Millers" series, written by the late Dr. C. O. Swanson. It is being reprinted at this time because of the large amount of rain which fell over the Southwest during the 1951 harvest season. In it Dr. Swanson discusses the effect of rain on the milling and baking qualities of the flours milled from wheat subjected to excess moisture.

THE 1941 harvest season was comparatively free from rains during the first part, but the latter part was unusually wet in the main wheat belt of Kansas. These climatic conditions afforded an opportunity to obtain wheat samples which had not been wetted, or only slightly wetted, by rain and also samples which had been exposed to considerable rain, giving the wheat the familiar bleached appearance. The former will be designated as non-weathered and the latter as weathered.

Farmers and millers were solicited for one sample of each kind. The request was made that the non-weathered samples should be from wheat harvested early and so had not been exposed to very much rain, and also that the weathered sample should be from wheat harvested late and thus had been exposed to considerable rain with consequent bleaching and lowering of test weight. A fine response was received and in testing the samples they were classed according to the information furnished by the sender.

It was realized that in samples obtained from such varying sources, there were many other factors other than wetting by rains which influenced the measures for quality. However, these samples represent what may appear on the market during wet and dry harvest seasons.

Preparation of the Samples

The samples as submitted were first passed through the laboratory wheat cleaner. The figures for test weight, obtained by the official method, together with small samples were submitted for grading to Martin Schuler of the Kansas City grain inspection office. The flour yields were obtained by milling the wheat on a Buhler experimental mill and the internal texture counts were made on cut sections obtained by means of a barley kernel cutter. These data on representative samples are given in Tables 1 and 2. The complete data have been reported by Swanson (1943). The samples represented in Tables 1 and 2 were selected to include the whole range of test weights which occurred both in the non-weathered and in the weathered group as classified by the donors of the samples. Most of the samples submitted showed very little or no damage.

Test Weight, Grade and Flour Yield

In the non-weathered group of samples (Table 1) the average test weight was 60.4 lb. with a range from 64.1 lb. to 57.7, a spread of 6.4 lb. For the weathered group the average was 56.5 lb., or nearly 4 lb. lower than for the non-weathered and the range from 60 to 54.8, a spread of 5.2 lb. Thus there were factors other than weathering, such as kernel shape and size, which influenced the test weight and these were as pronounced among the non-weathered, as well as the weathered samples. However, the consistently lower level of test weights among the weathered as compared with the non-weathered samples, shows the effects of wetting before cutting. The weathered sample from McPherson which had a test weight of 60 lb. would appear to have suffered little change from wetting but as there were several samples among the non-weathered groups which had test weights of 64 lb., this particular sample may have been reduced in test weight several pounds.

The percentages for external vitreousness and internal textures in Table 2 show clearly the effects of wetting. The average percentage of the internal vitreous texture for the non-weathered was approximately three times as large as for the weathered, and the average of the mealy kernels in the weathered samples was approximately six times as large as in the non-weathered samples. For some individual samples the spread is even greater, meaning that the

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wetting by rains was in such amounts that not only the bran coat had been affected, but large enough to cause swelling of the endosperm. Such swelling disturbs the internal compact arrangement in the vitreous kernels. Then after the water has escaped by evaporation vacuoles are left which influence the manner of light reflection and thus give the mealy appearance similar to what is obtained from white ice. The formation of these vacuoles decreases the specific gravity and hence the test weight. There are thus two factors which cause decrease in test weight: roughening of the bran coat and internal swelling of the endosperm.

The important fact is that the changes as a result of wetting (Tables 1 and 2) did not decrease the flour yield. The ash percentages show that the milling process was fairly uniform. The flour yields were generally as large from the low as from the high test weight samples for both the non-weathered and the weathered. The wetting which decreased the percentages of vitreousness as well as increased the internal mealiness had no effect on milling yield, mainly because (as has been shown in previous articles) flour yield is computed on the weight basis and not on the weight required to fill a fixed volume. Decrease in flour yield should not be expected since there was no loss of material when the internal compact vitreous structure was disturbed so as to give a mealy or chalky appearance.

Low test weight of wheat caused by wetting is in a different category from low test weight due to large proportion of fibrous material in bran covering or to small kernel diameters in relation to kernel lengths. Such kernel structures indicate a lower percentage of endosperm with consequent less flour yield.

The groupings of the data in Table 3 are based on the figures from the complete report (Swanson, 1943). They show the maxima and minima, within each numerical grade, of: external vitreousness; damage; test weight, internal textures such as vitreous, semi-vitreous and mealy; flour yield and ash. It should be noted that the spread in maxima and minima of flour yield and ash was essentially the same for the different grades. As much flour with the same ash was obtained from lower as from the higher grades.

Mixograms were made from all the flours milled from these wheat samples. Characteristics of mixogram patterns are determined mostly by variety and protein content. Great variations were observed in the patterns obtained, indicating that numerous varieties as well as different protein levels were represented. However, with only a few exceptions, the pair of mixograms obtained from the weathered and non-weathered wheats, as classed by the donors, indicated that both were of the same variety. Accordingly, it was possible to make comparisons to show the effect of weathering on the mixing characteristics. The general effect of weathering was to increase the time of dough development or the time in minutes and fractions from the moment the pen starts to rise until the peak is reached. This is considered to be the point at which maximum mechanical dough development has taken place. The heights of the mixograms were as a rule less for the weathered than for the nonweathered. The general effect of weathering on the mixogram characteristics has been found in numerous experiments to be like those which result from aging. This process at first causes the well-known improvement in baking properties of new wheat. The same process, if carried too far, will result in deterioration such as is found in old wheat or

Table 1 — Grading, Test Weights, Flour Yield and Ash of Nonweathered and Weathered Samples

Nonweathered

Origin of samples	Test weight	Grade	Flour yield	Ash
County—	lb.		%	%
Marion	64.1	1 DHW	71.7	0.40
Ellis	63.3	1 DHW	75.8	0.42
Ellsworth ..	62.7	1 DHW	73.2	0.47
Barton	61.6	1 HW	70.0	0.46
Russel	60.8	1 HW	70.3	0.42
Saline	59.9	2 HW	71.7	0.42
Saline	59.9	2 DHW	68.6	0.48
Harvey	57.8	3 DHW	70.0	0.45
Stafford ...	56.7	3 DHW	74.0	0.43
Average ...	60.4		71.0	0.45

Weathered

McPherson .	60.0	1 DHW	72.3	0.45
Russel	59.1	2 HW	72.3	0.40
Marion	58.9	2 HW	70.5	0.42
Barton	57.7	3 HW	72.2	0.43
Cheyenne ..	56.7	3 HW	77.6	0.47
Reno	55.8	4 YHW	73.9	0.43
Ford	54.8	4 HW	71.0	0.39
Average ...	56.5		72.0	0.45

Table 2—External and Internal Textures of Nonweathered and Weathered Samples

Nonweathered

Origin of samples	Grade	Ext. vitr.	Internal textures Vitr.	Semi vitr.	Mealy
County—		%	%	%	%
Marion ...	1 DHW	99	100	0	0
Ellis	1 DHW	99	100	0	0
Ellsworth .	1 DHW	91	97	0	3
Barton ...	1 HW	64	73	9	18
Russel ...	1 HW	55	68	15	17
Saline	2 HW	60	85	10	5
Saline	2 DHW	82	91	4	5
Harvey ...	3 DHW	96	96	2	2
Stafford ..	3 DHW	91	29	63	8
Average...		81	84	8	7

Weathered

McPherson.	1 DHW	45	29	9	52
Russel	2 HW	57	23	38	39
Marion ...	2 HW	51	61	13	26
Barton	3 HW	73	45	35	20
Cheyenne .	3 HW	60	23	60	17
Reno	4 YHW	7	2	9	89
Ford	4 HW	3	18	42	40
Average...		44.6	29.4	27.7	42.8

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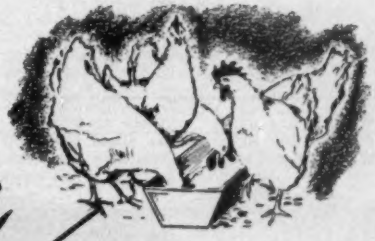

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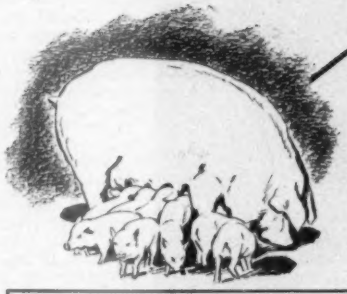

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Table 3—Relation of Grain Grades to Test Weights, Internal Textures and Flour Yields

Description	Grade	Vitr.	Damage	Test weight	Internal texture: Vitr.	Semi vitr.	Mealy	Flour yield	Ash
		%	%	lb.	%	%	%	%	%
Average	1 HRW	74.8	.04	61.5	79	7.9	13	71.5	0.44
Maximum		99.6	1.0	64.8	100	51	100	75.8	0.42
Minimum				60.0				65.0	0.36
Average	2 HRW	72.8	0.29	59.0	69.6	13.6	16.8	72.0	0.46
Maximum		96.0	3.5	59.9	100	38.0	68.0	76.4	0.4e
Minimum		28.0		58.3	17.0			66.9	0.43
Average	3 HRW	51.9	0.35	56.8	49.3	25.6	34.1	72.5	0.45
Maximum		96.0	3.2	57.9	96.0	63	94.0	77.6	0.47
Minimum				56.1	1	2	2	70.0	0.45
Average	4 HRW	37.5	0.47	55.2	25.4	31.6	43.0	71.8	0.45
Maximum		70.0	5.3	55.8	60	46	89	75.2	0.49
Minimum		7.0		54.4	2	7	15	67.8	0.42

flour. Thus the weathered samples had undergone more of the aging process than the non-weathered samples.

Since variety and protein content may affect the baking results even more than weathering, it was necessary to select pairs of comparable samples, one of which represented weathered and the other non-weathered wheat. The mixogram patterns, as well as the protein content, served as the basis of selection and 14 pairs were thus obtained.

The baking formula was:

Flour	100 g	Sugar	6 g
Yeast	2 g	Bromate	3 mg
Milk solids	4 g	Water	according to absorption
Salt	1.5 g		

The loaves obtained were measured for volume and judged on texture of grain and crumb color. The latter two characteristics did not show any differentiation between non-weathered and weathered samples. The average of the loaf volumes as obtained from the 14 non-weathered samples was 796 cc as compared with 822 cc for the weathered group. This was not due to higher maltose values since the average maltose value for the non-weathered samples was 172 and for the weathered 177, an insignificant difference.

As protein content may have even a greater effect on loaf volume than weathering, it was desirable to reduce to a uniform basis by determining the "protein factor." This factor is obtained by dividing the loaf volume by the protein percentage to get volume per unit of protein.

In all cases but two, the loaf volumes were larger from the weathered than from the non-weathered samples. In pair 14 the difference is not significant. In pair No. 7 the corrected loaf volume from the non-weathered sample was 647 cc and of the weathered 554 cc, showing a significant exception to all the others. The protein percentages of the wheats in this pair were: weathered 16.7 and non-weathered, 15.6; the maltose values were: weathered, 151; and non-weathered, 154. Hence, neither protein nor maltose was the determining factor. The explanation for this exception was furnished by the mixogram patterns. The non-weathered sample had a pattern like Turkey or Blackhull, while the weathered was typically Chiefkan which as a rule produces lower loaf volumes than Turkey or Blackhull.

Table 4—Maltose Values in Relation to Weathering and Vitreousness

Sample group	No. of samples	Maltose, milligrams Max.	Min.	Aver.
Nonweathered—				
Millers	17	247	138	168
Farmers	26	292	104	193
Weathered—				
Millers	17	264	116	155
Farmers	21	347	88	182
Vitreous—				
100%	6	292	195	246
75 to 100%	32	292	116	189
50 to 74%	18	347	135	191
25 to 49%	15	171	104	154
0 to 24%	16	248	88	163

Table 5—Effects of Amounts of Rainfall on Test Weights and Flour Yields

Place grown	Total rainfall No.	Total rainfall In.	Test wt. lb.	Flour yield %	Ash %
Manhattan	17	14.11	54.2	74.2	0.43
Thayer	12	13.32	57.9	72.8	0.42
Hays	15	11.45	56.2	71.8	0.42
Hutchinson	14	10.31	58.4	71.8	0.42
Columbus	9	7.84	55.2	73.5	0.43
Kingman	11	6.74	55.8	73.0	0.42
Tribune	14	6.27	58.9	72.0	0.43
Meade	8	5.91	56.9	72.0	0.44
Colby	13	4.19	57.9	73.0	0.42
Garden City	14	3.50	55.7	71.4	0.46
Dodge City	7	2.98	52.5	68.5	0.46

As a study was also made of the maltose values in the flours in relation to weathering and vitreousness. The data obtained are given in Table 4. These data show clearly that the process of weathering as a result of exposure to rain did not increase the maltose values. The data also indicate that the maltose values in the flour from vitreous kernels average higher than in those kernels which are less vitreous or more mealy. The more vitreous kernels were evidently from those which had had none or less wetting than those which were less vitreous or more mealy. Since the highly vitreous and non-weathered samples may have higher maltose values than the more mealy and weathered, the weathering process itself was of little influence in changing the maltose values. It was shown by Swanson (1935) that the moisture content must be increased to 27 to 30% and retained for 48 to 72 hours before the diastatic enzymes are notably activated. This amount of moisture was evidently not absorbed from rain and retained long enough

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June, 1942, was unusually wet in several localities in much of the main wheat belt of Kansas. Some localities had above average rainfall, and still others medium rainfall. This presented an opportunity to observe the effects of amounts of rainfall between heading and cutting on Blackhull, Chiefkan and Tenmarq grown in various localities (Swanson, 1944). The samples and much of the data were obtained from work done on a joint experiment station project designed to study the influence of environment on wheat varieties.

The data in Table 5 are from Tenmarq and were similar to the results from the other two varieties. The three groupings were made on the amount of rainfall rather than the number of rains. The upper group had about three times the average rainfall for June, the middle group about one half the above average. In the lower group, Dodge City had a little less than average while Colby had about one half above average and Garden City only a little above average.

Unfortunately the figures on test weight that would have been obtained in the absence of rain could not be known. Comparisons can therefore be made only on what is usually obtained. The lowest test weight, that from Dodge City, was evidently due to a shriveled condition caused by lack of moisture in the soil. This is reflected in the lowest flour yield with a high ash content. From the other stations the test weights do not range lower in the samples when the rainfall was highest as compared with the stations which had much smaller rainfall. It has been found in several experiments that the duration of the time of raining as well as the time of day is as important in affecting the test weight and texture as the amount of rain or even more so. Thus a slow small drizzling rain in the night may have a greater effect than a heavy rain in the day followed by sunshine. It is the amount of water actually absorbed by the kernels which causes the changes.

LITERATURE CITED

Swanson, C. O., 1935 — Some Factors Which Affect the Diastatic Activity of Wheat; Cereal Chem. 12:89-107.

———, 1943—Effects of Moisture on the Physical and Other Properties of Wheat II. Wetting During Harvest; Cereal Chem. 20:43-61.

———, 1944—Factors That Influence the Physical and Other Properties of Wheat V. Effect of Frequent Rains Accompanied by Storms on Blackhull, Chiefkan and Tenmarq; Cereal Chem. 21:126-140.

Western Condensing Announces Results of Whey Experiments

APPLETON, WIS.—The Western Condensing Co. here has announced that tests recently completed in its baking laboratories "demonstrate the value of sweet whey as a constituent in dairy ingredients for baked goods." The tests were undertaken to provide information regarding the role played by whey solids in improving the keeping qualities of bread.

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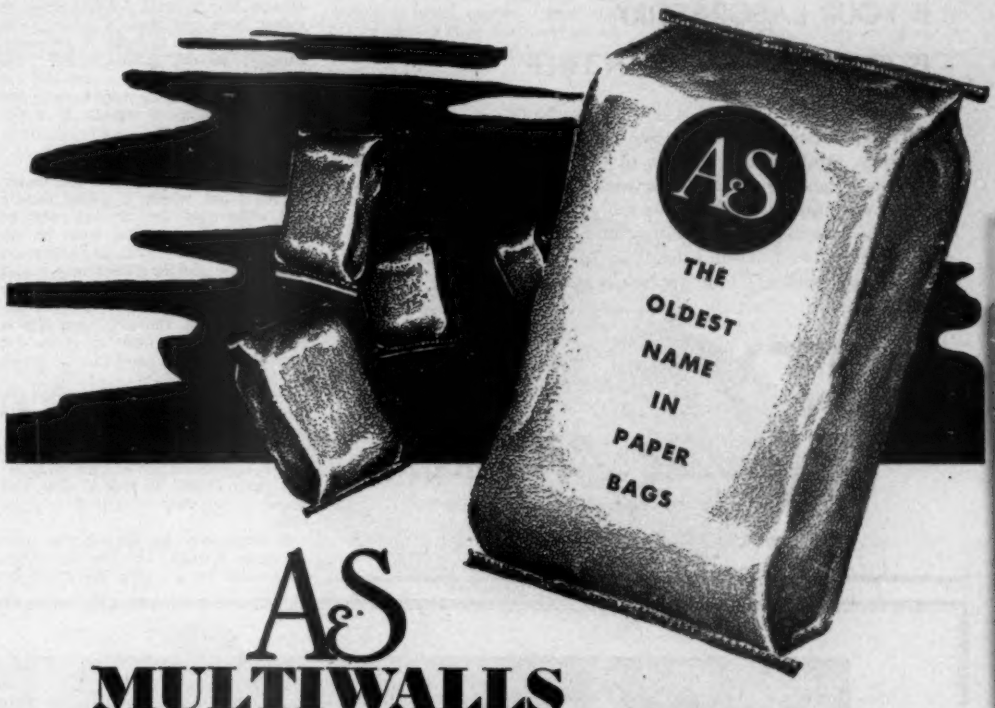
Tips for Tinsmiths

How to Do a Soldering Job

EDITOR'S NOTE: Following is the second and final article dealing with soldering different metals. The first article was published in the July issue of this journal.

IF material to be soldered is bright tinned iron, tinning of it may be considered needless. However, I believe it is generally best to follow a definite procedure which you know—not just hope—will give good results. Smear the cleaned surfaces of the joint and its immediate surroundings with paste, or brush on the flux if it is a liquid, so that the area is well covered. Use too much rather than too little. Flux is cheaper than a defective job. (Incidentally, don't use your finger to apply flux if it is corrosive, or you'll probably regret it later.) Now take the bit, sufficiently heated to insure its tinning and the clinging solder being thoroughly molten, but not "burnt." Apply more solder to it, and work the bit to and fro over the fluxed area, melting solder against the bit as you proceed.



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The same method may be used in putting a patch on a bucket, for instance. For a small leak, a drop of solder over the pinhole is generally quite sufficient to seal it properly. Finally, do not give the joint the chance of shifting till it has set. On some jobs it may be necessary to use C-clamps, wire or rivets to make sure it won't shift.

Do Not Overheat Bit

The bit should never be overheated to the point where it glows faintly red, otherwise the tinning will be oxidized, and retinning must be resorted to. If too cool, the solder on it will not remain sufficiently liquid to maintain a good heat transmitting area. When, however, the previous applications of the bit have left a rough surface, a somewhat cooler bit may be advantageously used to finish off the irregularities.

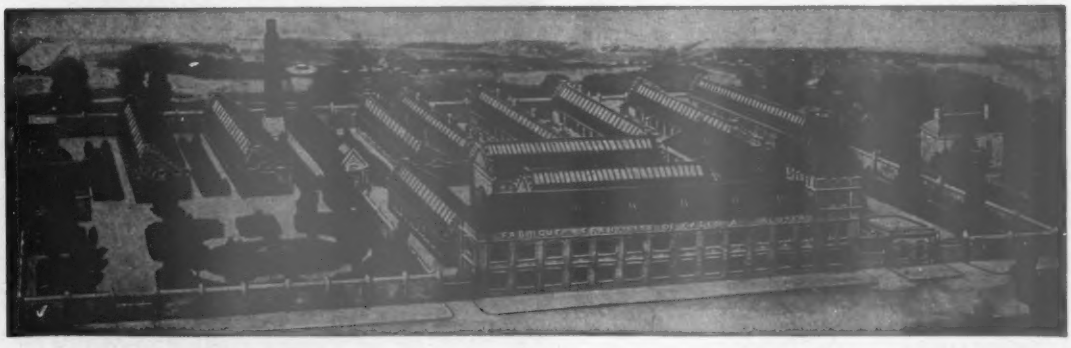
Since wide areas of sheet metal are apt to cool off the bit too rapidly for satisfactory work, auxiliary heating of the surrounding area by a torch flame may often prove very helpful; but care should be taken that the flame is adjusted so that it is light blue.

If work must be done in the open air or in a draft, and the bits must be heated by a torch, an excellent "stove" may be constructed with four bricks laid on each other in the form of an E without the center line of the letter; a couple more bricks laid on top of them to form a roof; and two more to close the open end. The open end of the E is of course faced away from the wind. If a ladle or pot is used, a generous coating of flux or carbon dust floated on top of the molten metal will help the latter to retain its heat and to stop oxidation.

Use the Correct Flux

Since, as we have seen, it is necessary for the solder or spelter used to have some affinity with the materials of the joint, it is evident that one kind of alloy will not do for every job. Besides this, it is advisable to use the lowest cost material, which will be perfectly satisfactory. Solders containing a high percentage of tin are stronger and in some ways easier to manipulate than those largely of lead; but if the job will be amply strong and satisfactory with low-tin solder, why use the much more costly high-tin material? A rough-and-ready test for high-tin solder is to bend the stick or bar while holding it close to the ear. Tin, being hard and crystalline, a slight squeaking sound can be heard when this is done. Tinsmiths call it "the cry of the tin."

Hard-soldering alloys have much higher melting points—in fact, it is generally necessary to bring both work and solder to a red heat after fluxing. The same is true of brazing spelter. The nature of the flux varies with the kind of metal, its melting point, the nature of the joint surfaces, and the heat to which the joint is exposed in use. For some low-melting solders even tallow is adequate. For most of them, rosin, sal ammoniac or killed spirits are advised.



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For hard-soldering and brazing, borax is used because it will not disintegrate or burn up at the red heat used, and is still liquid enough to flow easily into the joint and protect it.

Occasionally, it is required to use a solder of an extremely low melting point. In this case, other ingredients are mixed with the compound to lower its melting point, while retaining enough lead and tin, or at least lead, to give the solder characteristics needed.

Such low-melting alloys may be used for sealing the heads of fire-protection sprinkler heads (although the more modern types generally consist of a fusible link under strain from a compression spring). Fusible safety plugs for boilers, used to release the steam pressure should the shell become overheated through insufficient water, are preferably bought from the manufacturer complete.

An interesting alloy may be made by the addition of a small amount of antimony to the solder, for inserting a wire, etc., in a hole drilled in material which will only tin imperfectly —such as a carbon brush to which a loose or broken pigtail must be secured. This alloy is rather more difficult to manipulate than ordinary solder, but it has the curious property of expanding as it cools, instead of contracting, as do practically all other metals. As to carbon brushes, it is obvious that a much better plan than the above makeshift is to carry at least one spare set of brushes for each motor or generator. But only too often they are not in stock when they are wanted!

Soldering Galvanized Iron

When soldering galvanized iron, tin the bit well. For tinning the joint surfaces, you will have to use dilute hydrochloric acid instead of the usual killed spirits, because the latter has already taken up all the zinc it can, and so can exercise little cleaning effect on the zinc coating. Be sure to clean off all exposed surfaces of the joint especially well, otherwise the acid may spread corrosion later on.

In tinning hardened steel you are up against a difficulty. If the steel is allowed to get too hot you will "draw the temper," and if you try to retemper it again after soldering, you will melt the solder out. So what? Well, pure tin melts at 442°, and the temper of steel begins to draw at about 460° F.

All conditions must be as perfect as possible for tinning and soldering. First, apply dilute sulphuric acid to the steel and scratch brush or scrub the surface thoroughly till all the scale is removed. Wash off the solution in water, and then dip the parts to be tinned in a solution of one part of hydrochloric acid in 20 parts of water for a few seconds, and thence into a pot or ladle of molten tin. The trick is, of course, that the tin must be only just at the melting point. If you hit it right, you will get a tin coating on which to solder without affecting the temper of the steel. As soon as the tinning is completed, it is better to cool off the job in a draft or in warm water, to play safe. This applies to the average types of steel.

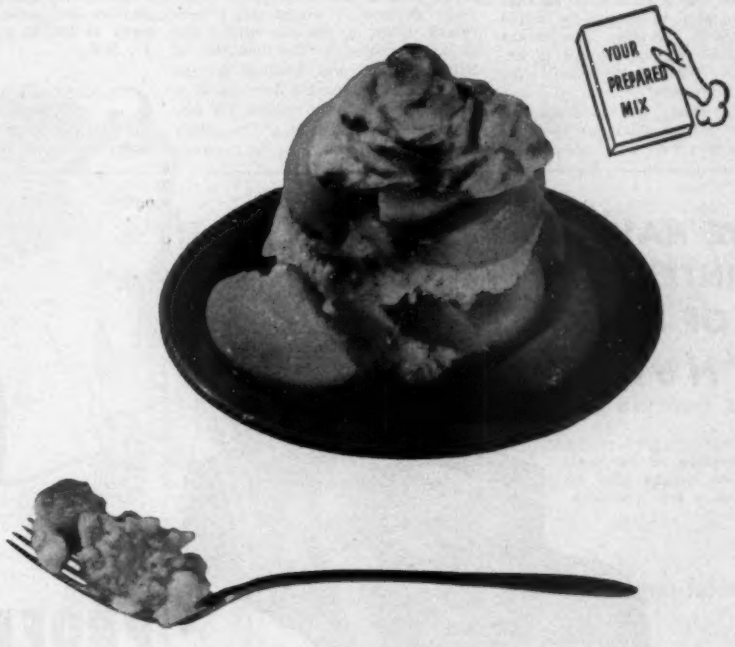
Certain kinds of "air-hardening" steel are not amenable to the treatment because they have a different tempering temperature range. (If you want to play extra safe, you can use a ladle containing two parts of lead to one of tin, because this melts at around 360° instead of 442, so that there is less chance of overheating the steel.)

In preparing to tin rusty iron, scrape, scratch brush or file off as much of the rust as you can. Then remove the rest with a solution of sulphuric or hydrochloric acid, combined with scraping. Then tin the job quickly. If you don't you may find that the acid has gone on working, and you have a coat of rust worse than you started with. Solder in the usual soft-solder way.

In soldering aluminum the main trouble is that when heated, it oxidizes as fast as it is cleaned, and has no affinity for the usual soft-solders. One method is to use a special solder and flux and scrape them continually into the surface under a torch flame. Another method, which is said to give excellent results, and which permits the use of ordinary soft-soldering methods, is to use a flux containing a strong solution of copper sulphate. While immersed in this flux, rub both surfaces to be joined with an iron rod. The chemical action between the iron and the copper sulphate will cause a thin, closely adherent film of copper to be deposited on the joint; and of course soldering on copper is about one of the easiest jobs there is.

From time to time, motor connecting cables of flexible extension cords break. The handy, but dangerous, way to effect a temporary repair is to twist the broken ends around each other with pliers, and let it go at that. The trouble is that they will be forgotten and left that way after the joint is "temporarily" taped up. All electrical wire joints should be exceptionally well soldered, because not only must they be fairly strong mechanically but they must also have a conductivity through the solder joint at least equal to that of the copper wire itself; and since lead and tin are much poorer conductors of electricity than copper, there must be plenty of soldered contact area. A few haphazard twists of wire are very likely to give such conductivity —especially if they are not evenly soldered afterwards.

First, cut back the insulation far enough to leave plenty of room for



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twists, plus enough space so that when the hot iron is applied the rubber will not melt down into the joint and make a botch of the job. Clean and scrape each wire thus exposed until it is bright; then flux and tin each thoroughly. A grooved bit is handy for average "splices" of this kind, as the wires can be twisted around in the groove until well tinned, and the soldering itself can be more readily done.

Having tinned the wires, twist the ends tightly together in the regulation manner, and apply the flux—which must be of a noncorrosive nature. Lay the joint thus formed in the tinned groove of the bit, allowing the flux to bubble until the wires are well heated and you are satisfied that the flux has penetrated every part of the job. Next, quickly apply the solder on the joint until the groove is flooded, turning the joint around so that every part of it is completely united and flooded by the alloy. The instant this happens the appearance is unmistakable, though somewhat hard to describe on paper.

A gentle shake will generally remove any untidy adhering "gobs" of solder; or they may be removed with a wiping action from the bit. Always wipe off the remaining flux before insulating the wires of different polarity with tape, for flux tends in most cases to soften and destroy the taping. Make sure, of course, that all exposed copper conductors are well insulated and covered up to prevent leakage of the "juice" where it isn't wanted.

Hard Soldering and Brazing

Hard soldering and brazing can be done only when both surfaces are thoroughly clean. Apply between them a thin coating of finely powdered borax mixed with hard solder, or spelter, as the case may be. Clamp the parts firmly together, and apply the torch until about dull-red hot. The moment the alloy "flushes" around the joint, remove the flame and quickly wipe off any "gobs" of drops before it cools past the pasty stage. Remove the clamp and, if necessary, clean up the job with a file or a scratchbrush. The methods of hard-soldering and brazing are so similar that a separate description of the latter is hardlly needed. (If you find difficulty in getting the solder or spelt to "stay put," as for instance on a vertical surface, smear the joint with a little soft-soldering paste and apply the borax and spelter to this. The paste will hold them in place until the borax liquefies. It will then boil out of the joint and burn off as red heat approaches.)

When one or more small objects are to be tinned or soldered, they may be fluxed and dipped into a ladle of molten soft or hard solder, or spelter (if brazing is required). Any parts which must not be coated with the alloy are left unfluxed, or if the metal is clean, they can be smeared with paint or some other obstructive nontinning material.

Instances and examples could be multiplied almost indefinitely but the information given above should be helpful to those to whom soldering and brazing present difficulties.

Lubrication of Grain Handling and Flour Milling Machinery

EDITOR'S NOTE: The accompanying article is an adaptation of the text of a booklet, "Lubrication," published by the Texas Company. It is reprinted here with the permission of the Texas Company. Copies of the booklet are available from the company at 135 E. 42nd St., New York 17, N.Y.

GRAIN handling and flour milling require the moving of large quantities of materials under conditions which often may develop problems in lubrication. The machinery must run continuously for long periods of time. In some northern areas conveyors in the elevators run virtually at atmospheric temperatures for several months during the winter. Dust must be removed because it can develop an explosion hazard. All this means that the machinery must operate dependably, through effective lubrication.

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er is equally as important. Since grain elevator equipment operates without the benefit of any heat, special consideration must be given to keeping lubricant "drag" at a minimum by using carefully selected oils and greases. A surprising amount of power can be lost in turning cold conveyor troughing rolls and return idlers, as hundreds of these are required for the long belts which are used.

The popularity of the motor driven conveyor has been impelled by the applicability of the unit type of drive. Motors also drive the blowers, and exhausters for creating vacuum up to 8 in. when grain is to be removed from holds of ships by suction. Induction type motors are used for such drives to reduce the possibility of arcing and dust explosion. The elevator people, however, do not rely entirely upon this precaution; they also provide means to prevent dust accumulation by installing suction dust-gathering devices located at strategic points with respect to the conveyor belts.

Anti-friction bearings and unit type of reduction gear drives are well adapted to grain handling service. Safety of personnel is decidedly affected by their usage, inasmuch as their location in certain parts of the elevator may often be hazardous, even for re-lubrication, not to mention repair. The use of equipment which will reduce the necessity for frequent re-lubrication and lengthen the machine's useful life is therefore of material advantage.

Prevention of dust accumulation benefits lubrication in that possibility of contamination of bearing, gear and chain lubricants is reduced, thus enabling them to more effectively perform their intended functions. Reduced maintenance and replacement costs and marked increase in power economies follow especially when properly designed sealed housings for bearings, chains, and reduction gears are provided.

Temperature Must be Controlled

Temperature control is essential in the handling of grain and finely ground cereal flours especially when the former may be damp and apt to develop chemical action, which will cause rise in temperature. Between individual particles this is not serious but the cumulative effect of millions of such particles packed in close contact must be considered. For this reason, great care is taken to control bin temperatures, by blasts of cold air. This also prevents premature fermentation of grain which might otherwise occur under high temperatures, and decreases the possibility of dust explosions, which have a direct relation to temperature and the dust content of the air.

The requirement of large quantities of air for the movement of grain or for the elimination of dust, creates the need for high capacity fans and blowers. The importance of these units necessitates faultless design and effective lubrication to insure continuous operation.

Grain Conveyors

Grain conveyors are built for endurance and hard service. Several types are used, i.e., the screw, ribbon, bucket or belt design.

The screw type, which is essentially a stamped or rolled steel spiral, secured by lugs or welded to a pipe shaft, and the ribbon conveyor which consists of a ribbon flight similarly secured to the shaft with an open space between the ribbon and shaft, are subject probably to the most severe service.

The screw is designed for horizontal moving of dry materials or on inclines up to 15°, with reduced capacity. It is constructed to revolve in a box of steel, wood, cast-iron or concrete, according to the nature of the materials to be handled. The screw shaft normally is carried by plain bearings which are grease lubricated.

The bucket conveyor is the principal elevating medium in the handling of grain, by means of bucket-shaped receptacles. It can be constructed for vertical as well as horizontal service. Constructional features vary but the principles are similar in all. These conveyors will handle practically any material which will not adhere to the containers. A bucket conveyor usually consists of a belt to which the buckets are attached. It may be verical or inclined and have continuous or non-continuous buckets. The discharge and intake of such a conveyor will depend upon the locality, material to be handled, and the general purposes for which handling is carried out.

Belt conveyors involve an endless belt of fabric or rubber designed to travel over pulleys at the conveyor ends, the loaded section being supported on troughing idlers at the sides which allow the belt to form into a trough. The empty belt is supported on straight idlers. Such a conveyor will handle any material in bulk which will not adhere to it, and which can be properly fed thereto. Belt conveyors are very widely used for handling grain over the bins. The length of these conveyors in the modern elevator requires the use of hundreds of idlers of either plain

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or anti-friction bearing type. Lubrication of these bearings can be most efficiently accomplished through the use of a short fibre, mixed-base grease. This is most important when temperatures are low in that this type of grease offers "quick shear" or "low lubricant drag" allowing the belt to be brought up to normal operating speed with a minimum of power demand. This type of grease will also form an effective collar or seal at the end of the bearing which excludes dust and keeps wear to a minimum.

Motor and Conveyor Bearings

The electric motor is the predominating prime mover in the grain elevator as well as the flour mill, operating through chain drives or speed reduction gears. The manner of installation, however, will vary according to location of the various driven elements. Group driving from a common source of power transmission will be practicable in some elevators; in others individual drive to each exhauster, suction blower or conveyor will prevail.

Regardless of the type of installation, lubrication is most important, especially where gears and bearings are in close proximity and there is possibility of contamination of lubricants by dust. When the anti-friction bearing was made available it enabled design and construction of bearing housings which could be more readily sealed against entry of dust. Both ball and roller bearings have been successfully applied to grain elevator and mill motors, in general designed for grease lubrication by the same grease as used on comparable conveyor bearings.

The selection of lubricants for anti-friction bearings must be studied with full realization of the difficulties which may result from use of an unsuitable product. Best results will be obtained from a grease of normal consistency, capable of functioning at high temperatures to insure against breakdown and separation, although, in general, motor, conveyor and blower bearings in the elevator and mill will seldom exceed 125° F., in average service.

Yet, overheating in the bearing itself may occur in direct relation to the amount of lubricant used, particularly if this latter is a grease. If it is too heavy or inert, an excessive quantity in any anti-friction bearing may lead to a considerable rise in temperature due almost entirely to internal friction within the grease itself. Obviously were this to continue explosion temperatures might be approached, should there be any appreciable amount of dust present in the air surrounding the bearings in question. In view of the necessity for guarding against over-lubrication, careful elevator operators observe a regular schedule for greasing all anti-friction bearings applying but a very small amount of fresh grease at intervals of from one to three months, according to the location of the bearings, the tightness of the housings, and the time operated. Electric motor bearings must be very carefully lubricated, for use of grease to any appreciable excess may lead to rupture of the seal and fouling of the windings. This will be aggravated where windage, or draft occurs through the bearings and motor. Moisture might, in turn, cause arcing and sparks, which in the presence of grain dust might result in an explosion. For this reason explosion-proof motors are very widely used.

Speed Reduction Gears

The closed type speed reducer has a definite place in grain elevator service. As the primary element in transmission of power to conveying equipment, and the various machines in the subsequent grinding and screening operations the speed reducer is a dominating factor.

The modern, oil-tight dust-tight gear case is a decided adjunct to effective lubrication and prevention of wear. The essential characteristics of a good gear lubricant are that it shall provide protection to the gears and bearings through the provision of a strong film of oil that will resist rupture even under abnormal loads. These gears and bearings are highly finished and must also be protected by the lubricant against rusting and corrosion during idle periods. Extreme caution should be used at all times in the handling of these gear oils to keep them clean. Grain dust is abrasive and if it is not kept out of these housings rapid wear will ensue.

Where gears operate in housings that are not oil or dust tight, relubrication is necessary at shorter intervals to remove the contaminated lubricant. The lubricant must of necessity be of a type that will not allow the oil and dust mixture to build up on the gear teeth as excessive bearing pressures will occur in addition to excessive wear.

Lubrication recommendations are made based on operating conditions and design, so the lubrication engineer must develop the best practices possible to meet and serve the conditions existing. To a certain extent recommendations are possible for alteration in bearing design, or gear and bearing protection against dust, but the changes must actually be carried out by the mechanical organization of the plant.

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the oil level should be sufficiently high to insure suitable dipping of the teeth of the lower gear. Submergence of too much of the gear or pinion is not advisable and, as a general rule, unless comparatively fluid oils are used, it will not be necessary. The teeth will carry enough oil up to those of the companion gear.

With heavier gear lubricants, it will be possible to run with a somewhat lower level than where more fluid products are used. It is for this reason that reduction gear units are usually equipped with an external gauge glass to enable the operator to observe at all times just what level he is carrying.

The Geared Motor

The geared motor is well suited to blower and conveyor service due to its unit housing design and facilities for automatic lubrication. In this unit the bearings are similar to the bearings of the modern type of motor, being largely anti-friction, designed for grease lubrication. The reduction gear set, however, is designed for oil lubrication, the oil being contained in a bath at a sufficient level to insure proper dipping of the lower gear teeth. As a general rule, it is advisable to keep the oil bath at the level recommended by the manufacturer which is normally from one-third to one-half full, so that the bottom gears will be about half submerged. According to the temperatures of operation and extent to which heat may be transmitted to the gear case from the motor itself, an oil of from 500 to 900 seconds Saybolt Viscosity at 100° F. is used at normal temperatures; at low temperatures it is necessary to use an oil of good pour test to insure adequate fluidity and reduction of drag.

Dust Control

The dust content of the air in the modern grain elevator must be kept down to prevent explosions and fires. There is an added advantage, however, in that personal welfare of employees is increased and cleanliness around equipment is improved. For this purpose, the suction blower or exhauster is a valuable piece of equipment. Normally but a slight amount of vacuum is required to remove effectively all dust from grain as it passes over conveyors. In the early stages of handling, however, where the grain itself is actually moved by suction, for example with suction unloaders, a vacuum of up to 8 in. may be necessary.

The bearings of blowers and exhausters are very similar to the motor bearings found in the grain elevator or mill being either fitted with ring oilers or ball or roller bearings. Their lubrication requirements also are comparable to those of the motors.

Ring oilers provide a flood of oil which is constantly passed through the bearings, thereby washing out any grit, dirt, dust or metallic particles that may have gained entry. On account of this washing action of the oil, however, the reservoir will gradually tend to accumulate a certain amount of sedimentary deposits. Therefore, it should be flushed out and cleaned at periodic intervals, the old oil being replaced with a fresh charge. In elevator and mill practice a good quality straight mineral oil of around 300 seconds Saybolt Universal Viscosity will be used at normal temperatures.

Where ball or roller bearings serve to support the journals of fans, rotors or impeller, each is individually lubricated periodically. Prevention of corrosion in such bearings, is regarded by many as perhaps the chief function of the lubricant, rather than actual reduction of friction or removal of heat. Grease is generally used for this purpose. It should be a high quality anti-friction bearing grease specifically prepared to resist chemical or physical change.

All fans and blowers, however, will not require or be equipped with ring oilers or anti-friction bearings. In certain cases plain bearings lubricated by grease cups, pressure gun fittings or sight feed oiling devices may be regarded as suitable by the builders, especially where operation is to be more or less intermittent. For such service a medium bodied engine oil or a medium grade of compression cup grease can be used.

Lubrication in the Mill

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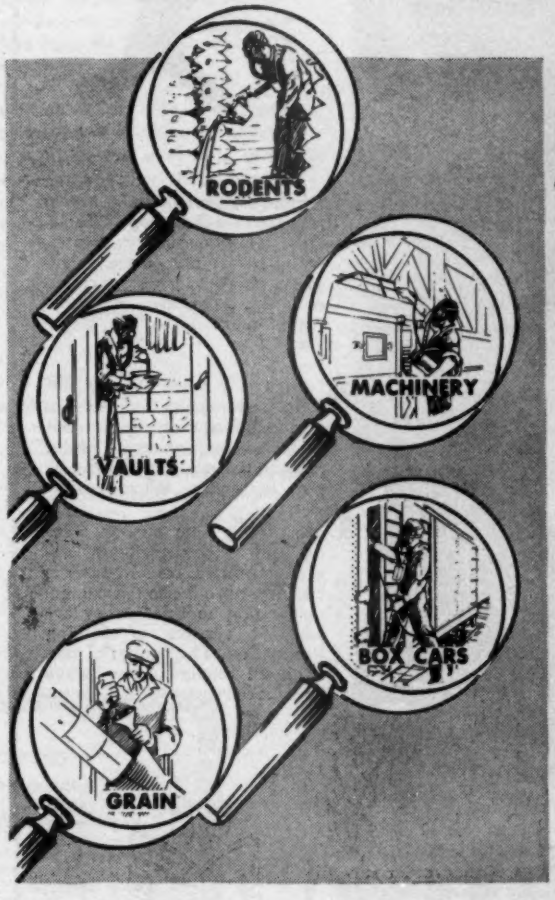

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are incident only to storage, the grain elevators serving as receiving containers, so to speak, to hold the grains until they go to the mills for grinding to flour, cornmeal, or processing into cereal foodstuffs.

The flour mill takes probably the majority of all grains harvested and has perhaps the most interesting assembly of machinery from a lubrication point of view.

During the cleaning procedure grain goes over cleaning screens, scourers, brush polishers and through the tempering process.

The bearings and eccentrics may run warm on certain types of screens, especially if there is too much freedom of motion. The lubricant should therefore be selected with this thought in mind, planning on a viscosity which will be ample to take up the shock loads.

Grinding and Milling Machinery

In the more modern mills the rolls are mounted on ring oiled plain babbitted bearings. In the older machines, however, the fixed collar type of bearing prevails, the collar on the shaft or roll neck dipping into an oil reservoir to carry up oil for distribution to the bearing. This collar helps to restrict the lateral motion of the roll.

In addition to the comparatively high pressures involved, the lubrication engineer must consider the speed of around 50 rpm when selecting the roll bearing lubricant. If oil is required it must be heavy enough to maintain a film which will withstand the pressure imposed without danger of boundary lubrication; at the same time it must not develop too much fluid friction under the speeds involved, otherwise bearing temperatures might rise to add to the heat developed during grinding. For this reason, heat control is maintained by radiation and ventilating the rolls and bearings.

Sifters may be of different types; a widely used form is a large box-like arrangement suspended from ceiling beams or upper supports on long wood reeds of from ¾ in. to ⅞ in. in diameter. Two, four or six of these boxlike sifters are usually grouped around a central vertical shaft to which they are connected, and from which they receive a gyratory action through offset spindles. The shaft turns at a speed according to the circle. For re-bolting and special jobs the speed is usually 265 rpm making a 2½-in. circle. Some 1½-in circle machines turn at 345 rpm. It is mounted on a step bearing which carries the weight of the shaft and pulleys.

While a good quality, medium bodied machine oil will effectively lubricate some step bearings, when grease is required it must of necessity be resistant to throw-off and should have a fairly high-melting point to insure continuous lubrication. Normally, these bearings are lubricated through remote grease fittings or compression cups at intermittent intervals and the grease used must provide adequate lubrication for the period otherwise excessive heating and wear will occur.

Bran Machinery

Bran is one of the chief by-products produced in the manufacture of flour. It is passed through bran dusters which remove any adhering endosperm. A bran duster can be horizontal or verticle. The latter contains a vertical cylinder of cloth on a frame which revolves slowly inside the housing. The bran is spouted in at the top, and by means of a revolving disc is distributed over this cloth (or case). Brushes which are attached to the central spindle revolve at 300 to 450 rpm; they dust off the particles of bran. Flour is discharged at the bottom through a suitable opening.

The lower head of the case revolves in a babbitted, oil-retaining bearing. The spindle which carries the brushes is mounted on a step bearing at the bottom, and is usually equipped with a self-oiling bearing at the top. The driving belt is passed over a pulley on the spindle shaft just above its step bearing outside the housing. Slower motion is imparted to the case by means of encased gears or a small short-centered belt.

Conclusion

The handling of grain from the time it is received at the elevator to the time the flour or finished cereals are packaged for the market—is a fascinating procedure. It interests the mill management who are responsible for production at the lowest possible cost. It interests the materials handling engineer because it involves production-line conveying methods. It interests the fire prevention and insurance people because static electricity may cause dust explosions if temperatures and ventilation are not properly controlled. It interests the lubrication engineer because he, along with the maintenance people must keep the conveyors running efficiently and the mill roll drives, and other mechanism bearings properly lubricated at all times regardless of the weather.

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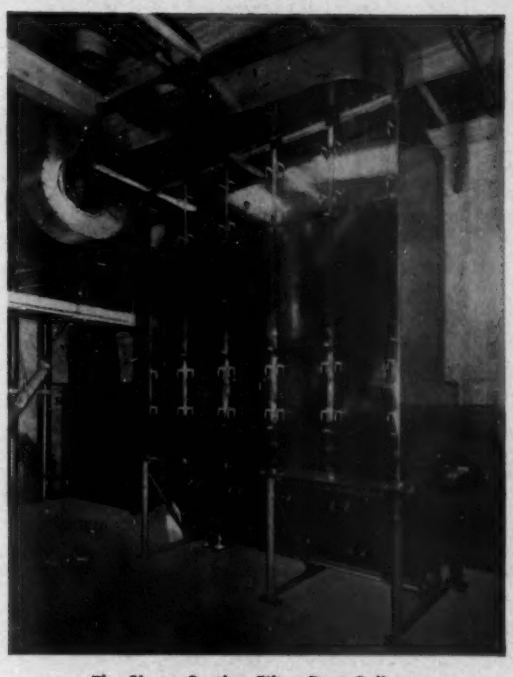

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Write to us for complete information on "ENTOLETER" Centrifugal Machines and the Simon Suction Filter Dust Collector. We will be glad to make recommendations to meet sanitation and dust control problems encountered in mill operation. ENTOLETER DIVISION, The Safety Car Heating and Lighting Co., Inc., 1189 Dixwell Avenue, New Haven 4, Connecticut.

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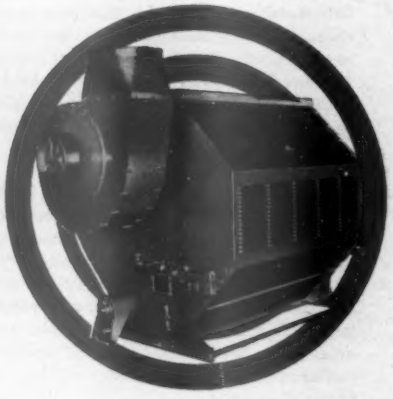

THE MILLERATOR? The Carter Millerator is most commonly used at the head of the cleaning systems. Here it efficiently performs secondary scalping operations, removes sand, dust, seed, and light screenings by dependable screening and thorough aspiration. The machine requires small space and very little power. Outstanding features that contribute to its high operating efficiency and low operating cost are: its ball and bevel self-cleaning screens which assure uniform results and require no attention; its mechanical removal of dust and fine screenings which requires a smaller air volume; its well-balanced aspirating system which provides accurate, easy control.

THE DUO-ASPIRATOR? Even from supposedly "clean" grain, the Carter Duo-Aspirator will remove a surprising amount of screenings, particularly light foreign material. This thorough aspiration is made possible through an exclusive Hart-Carter principle of selective control. By means of an evenly-controlled stream of air drawn at right angles through a smoothly flowing stream of grain, the Duo-Aspirator effectively removes light foreign material. The Duo-Aspirator is widely recognized as the most simple, accurate, and inexpensive means of aspirating grains, seeds, broken grain, groats, rice, scratch feeds, and similar free flowing stock. The machine shown above is one of the newly designed open-circuit models. The widely used closed-circuit machine is also available in a new model.

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